

PATENT APPLICATION

of

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for a

MECHANICAL INTERACTION WITH A PHONE

USING A CRADLE

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MECHANICAL INTERACTION WITH A PHONE USING A CRADLE

5 Field of the Invention

This invention generally relates to communication devices such as mobile phones and more specifically to utilizing a specialized cradle having mechanical switches for facilitating interactions between said devices and a user of said devices.

Background of the Invention

10 1. Problem Formulation

When driving a bike or a car, resources used to interact with a mobile device (phone) are limited. Operator's eyes are occupied most of the time for monitoring the traffic and hands are used for other tasks such as operating vehicle steering. However, current phone interaction is highly dependent on a visual feedback from a display, and
15 precise motor operations. More simple and robust techniques are needed for the most important tasks, such as, e.g., incoming call handling.

2. Prior Art Solutions

Speech commands have been used in vehicles. However, when driving (especially a bike), surrounding noises reduce a reliability of an automatic speech
20 recognition. Using the speech recognition alone is also difficult; the reliability of the recognition is much higher when an activation button is used to explicitly start the recognition. This limits the usefulness of the speech recognition, since instead of pressing a "start recognition" key, the user can as easily press an "answer incoming call" key.

25 Some cars also have dedicated keys installed for simple phone commands (e.g., Send / End keys). This solution is pretty good in terms of usability and safety, but requires complex installation.

Acceleration sensors can be used to detect simple tap or tilt gestures. For example, the user can simply tap the phone front to answer a call. However, the acceleration-sensing is sensitive to external disturbances, especially when driving on a bumpy road, or when using a non-spring-supported vehicle (e.g. most bikes do not have springs).

Summary of the Invention

The object of the present invention is to provide a methodology for using a specialized cradle having mechanical switches for facilitating interactions between a communication device (such as a mobile device or a mobile phone) and a user of said devices, wherein said communication device is mounted on said cradle.

According to a first aspect of the invention, a method for transferring at least one predetermined command by a user to a communication device using a cradle, comprising the steps of: pushing said communication device in a predetermined direction to impose a pushing action on, or to make a physical contact of said communication device, with at least one switch of the cradle to reverse a state of said at least one switch, wherein said communication device is mounted on said cradle and optionally there is no said physical contact before said pushing; and communicating said reversal of the state of said at least one switch to said communication device, wherein said reversal is interpreted by the communication device as said at least one predetermined command by the user.

According further to the first aspect of the invention, the step of pushing said communication device may be implemented by applying a mechanical force to said communication device by the user, and wherein said pushing action or said physical contact is characterized in that said mechanical force creates a push force of said communication device on the at least one switch. Further, said at least one switch may be a vertical switch located on a bottom of the cradle in such a way that said vertical switch reverses its state when the push force is in a vertical direction, wherein said communication device may be optionally supported by said vertical switch when the push force is not applied. Still further, there may be the at least one switch in addition to the vertical switch contained in the cradle and said vertical switch may be used as a

pivotal point for guiding the communication device towards said at least one switch. Yet still further, said pivotal point may be used as the vertical switch with the higher push force required for its reversal than for any other of the at least one switch, or said pivotal point may be only used for said guiding and not as a reversal switch.

5 Further according to the first aspect of the invention, in addition to said vertical switch, said at least one switch may be located on the bottom of the cradle in a plane parallel to a front plane of said communication device and containing said vertical switch and wherein said at least one switch reverses its state when the push force is created by a front tilting motion of said communication device in the plane
10 parallel to the front plane of said communication device optionally using said vertical switch as a pivotal point for facilitating said front tilting motion. Further, in addition to said vertical switch, said at least one switch may be located on the bottom of the cradle in a plane parallel to a side plane of said communication device and containing said vertical switch and wherein said at least one switch reverses its state when the
15 push force is created by a side tilting motion of said communication device in the plane parallel to the side plane of said communication device optionally using said vertical switch as a pivotal point for facilitating the side tilting motion. Still further, in addition to said vertical switch, said at least one switch may be located on a side of the cradle, said side being perpendicular to said bottom, in a plane parallel to a front
20 plane of said communication device and containing said vertical switch and wherein said at least one switch reverses its state when the push force is created by a front tilting motion of said communication device in the plane parallel to the front plane of said communication device optionally using said vertical switch as a pivotal point for facilitating said front tilting motion. Yet still further, in addition to said vertical
25 switch, said at least one switch may be located on a side of the cradle, said side being perpendicular to said bottom, in a plane parallel to a side plane of said communication device and containing said vertical switch and wherein said at least one switch reverses its state when the push force is created by a side tilting motion of said communication device in the plane parallel to the side plane of said communication
30 device optionally using said vertical switch as a pivotal point for facilitating the side tilting motion.

Still further according to the first aspect of the invention, the step of communicating said reversal may comprise the steps of: sending at least one reversal signal by the at least one switch to a communication block; and sending at least one command signal by the communication block to the communication device, wherein
 5 said at least one command signal completes said transferring of said at least one predetermined command signal. Still further, the command signal may be sent via a wire connection or via a wireless connection by the communication block to the communication device.

According further to the first aspect of the invention, the communication
 10 device may be a mobile device or a mobile phone.

According still further to the first aspect of the invention, the step of pushing said communication device in a predetermined direction is performed by the user.

According further still to the first aspect of the invention, the cradle may be attached to a car dashboard or to a handle bar of a bicycle.

According to a second aspect of the invention, a cradle for transferring at least
 15 one predetermined command to a communication device by a user, comprising: at least one switch, responsive to a pushing action of, or to making a physical contact with, said communication device facilitated by pushing said communication device in a predetermined direction by a user, for providing a reversal signal indicative of
 20 changing a state of said at least one switch in response to said push or the physical contact, wherein said communication device is mounted on said cradle and optionally there is no said physical contact before said pushing is applied; and a communication block, responsive to said reversal signal, for providing a command signal to said communication device, wherein said at least one command signal completes said
 25 transferring of said at least one predetermined command signal to the communication device by the user.

According further to the second aspect of the invention, the command signal may be sent via a wire connection or via a wireless connection by the communication block to the communication device.

Further according to the second aspect of the invention, the pushing of said
 30 communication device may be implemented by applying a mechanical force to said

communication device by the user, and wherein said pushing action or a physical contact is characterized in that said mechanical force creates a push force of said communication device on the at least one switch. Further, said at least one switch may be a vertical switch located on a bottom of the cradle in such a way that said at least one switch reverses its state when the push force is in a vertical direction, wherein said communication device is optionally supported by said vertical switch when the push force is not applied. Still further, there may be the at least one switch in addition to the vertical switch contained in the cradle and said vertical switch is used as a pivotal point for guiding the communication device towards said at least one switch. Still further, said pivotal point may be used as the vertical switch with the higher push force required for its reversal than for any other of the at least one switch, or said pivotal point may be only used for said guiding and not as a reversal switch.

Yet still further according to the second aspect of the invention, in addition to said vertical switch, said at least one switch may be located on the bottom of the cradle in a plane parallel to a front plane of said communication device and containing said vertical switch and wherein said at least one switch reverses its state when the push force is created by a front tilting motion of said communication device in the plane parallel to the front plane of said communication device optionally using said vertical switch as a pivotal point for facilitating said front tilting motion. Further, in addition to said vertical switch, said at least one switch may be located on the bottom of the cradle in a plane parallel to a side plane of said communication device and containing said vertical switch and wherein said at least one switch reverses its state when the push force is created by a side tilting motion of said communication device in the plane parallel to the side plane of said communication device optionally using said vertical switch as a pivotal point for facilitating the side tilting motion. Still further, in addition to said vertical switch, said at least one switch may be located on a side of the cradle, said side being perpendicular to said bottom, in a plane parallel to a front plane of said communication device and containing said vertical switch and wherein said at least one switch reverses its state when the push force is created by a front tilting motion of said communication device in the plane parallel to the front plane of said communication device optionally using said vertical switch as a pivotal point for facilitating said front tilting motion. Yet still further, in addition to said

vertical switch, said at least one switch may be located on a side of the cradle, said side being perpendicular to said bottom, in a plane parallel to a side plane of said communication device and containing said vertical switch and wherein said at least one switch reverses its state when the push force is created by a side tilting motion of said communication device in the plane parallel to the side plane of said communication device optionally using said vertical switch as a pivotal point for facilitating the side tilting motion.

Still further according to the second aspect of the invention, said communication device mounted on said cradle may be a mobile device or a mobile phone.

According further to the second aspect of the invention, the cradle may be attached to a car dashboard or to a handle bar of a bicycle.

The present invention describes an alternative to an acceleration-sensing method that is more robust and more suitable for all driving conditions with a bike or a car. Since the tilting of the phone is sensed by mechanical switches, the solution is much less prone to external accelerations. The mechanical switches also give a tactile feedback to the user, which is helpful since other feedback types may be absent (especially a visual feedback is limited by a visual attention to a surrounding traffic).

Brief Description of the Drawings

For a better understanding of the nature and objects of the present invention, reference is made to the following detailed description taken in conjunction with the following drawings, in which:

Figure 1a and 1b show front and side views, respectively, representing an example of mounting a communication device in a cradle with a vertical switch and using a vertical motion of the communication device to activate the switch, according to the present invention.

Figure 2a and 2b show front and side views, respectively, representing an example of mounting a communication device in a cradle with a vertical switch and additional switches located on a bottom of the cradle and using a vertical motion

and/or tilting motion of the communication device to activate one of the switches, according to the present invention.

Figure 3a and 3b show front and side views, respectively, representing an example of mounting a communication device in a cradle with a vertical switch and
 5 additional switches located on a side of the cradle (said side is perpendicular to a bottom of the cradle) and using a vertical motion and/or tilting motion of the communication device to activate one of the switches, according to the present invention.

Figure 4 is a block diagram of transferring signals and mechanical forces
 10 between a cradle, a user and a communication device.

Best Mode for Carrying Out the Invention

The present invention provides a novel methodology for using a special cradle having mechanical switches to facilitate interactions between a communication device, such as a mobile device or a mobile phone, and a user of said devices, wherein
 15 said communication device is mounted on said cradle.

The cradle can be attached for example to a car dashboard (like in current car kits) and/or to a handle bar of a bicycle. When the user pushes the communication device such as the mobile phone in different directions, the phone moves and tilts within said stabile cradle. The movements are registered through the mechanical
 20 switches within the cradle. The states of the switches are communicated to the phone through a mechanical connector (e.g., pop port) or a wireless communication channel (such as bluetooth) as a corresponding command, and the user interface reacts accordingly. At least 5 tilt/push operations are feasible, as described in different examples of Figures 1a and 1b, 2a and 2b, 3a and 3b. For the purpose of the present
 25 invention, the term “pushing” is used to accommodate all kinds of movement of said communication device including pulling, actuating, tilting, etc.

Figure 1a and 1b show front and side views, respectively, representing an example among others of mounting a communication device (e.g., a mobile phone) 10 in a cradle 12 with a vertical switch 14 located on a bottom of the cradle 12, and using

a vertical motion 16 of the communication device 10, imposed on said communication device 10 by a user 11, to activate the switch 14 by a physical contact with said device 10 (optionally) or by pushing said switch 14 by said device 10 enough to reverse a state of said switch 14, according to the present invention. The cradle 12 can contain mechanical structures (not shown in detail in Figures 1a and 1b) for guiding the device (phone) 10 movements towards the switch 14. The physical contact of the device 10 with the switch 14 is optional before said pushing is applied. The reversal of the state of the switch 14 is communicated to said communication device 10 wherein said reversal is interpreted by the communication device 10 as a predetermined command given by the user 11, as described below in detail in regard to Figure 4.

Figures 1 and 1b demonstrate the most simple implementation of the present invention with just one switch 14. More complex scenarios with multiple switches are shown in Figures 2a and 2b, 3a and 3b.

Figure 2a and 2b show front and side views, respectively, representing one example among others of mounting the communication device 10 in a cradle 12a with the vertical switch 14 and additional switches 18a and 18b, respectively, located on a bottom of the cradle 12a and using the vertical motion 16 or tilting motions 20 or 22 of the communication device 10, imposed on said communication device 10 by the user 11, to activate at least one of the switches 14, 18a or 18b by a physical contact with said device 10 (optionally) or by pushing said switch 14, 18a or 18b (using the device 10) deep enough to reverse a state of said switch 14, 18a or 18b, according to the present invention. The cradle 12 can contain mechanical structures (not shown in detail in Figures 2a and 2b) for guiding the device (phone) 10 movements towards the switch 14, 18a or 18b. As in Figure 1, the physical contact of the device 10 with any of the switches 14, 18a or 18b before said pushing is applied by the user 11 is optional.

Figure 2a, in addition to said vertical switch 14, shows two switches 18a located on the bottom of the cradle 12a (on both sides of the switch 14) in a plane parallel to a front plane of said communication device 10 and containing said vertical switch 14 and wherein said switches 18a reverse their state when pushed by said communication device 10, optionally using said vertical switch 14 as a pivotal point

14a for facilitating said front tilting motion 20 of the device 10. Figure 2b, in addition to said vertical switch 14, shows two switches 18b located on the bottom of the cradle 12a (on both sides of the switch 14) in a plane parallel to a side plane (or perpendicular to the front plane) of said communication device 10 and containing said vertical switch 14 and wherein said switches 18b reverse their state when pushed by said communication device 10, optionally using said vertical switch 14 as a pivotal point 14a for facilitating said side tilting motion 22 of the device 10.

As in Figure 1, the reversal of the state of the switches 14, 18a or 18b is communicated to said communication device 10 wherein said reversal is interpreted by the communication device 10 as the predetermined command given by the user 11, as described below in detail in regard to Figure 4.

Figure 3a and 3b show front and side views, respectively, representing an example among others of mounting the communication device 10 in a cradle 12b with the vertical switch 14 and additional switches 18c and 18d, respectively, located on a side of the cradle 12a and using the vertical motion 16 or tilting motions 20 or 22 of the communication device 10, imposed on said communication device 10 by the user 11, to activate at least one of the switches 14, 18c or 18b by a physical contact with said device 10 (optionally) or by pushing said switch 14, 18c or 18d (using the device 10) deep enough to reverse a state of said switch 14, 18c or 18d, according to the present invention. The cradle 12 can contain mechanical structures (not shown in detail in Figures 3a and 3b) for guiding the device (phone) 10 movements towards the switch 14, 18c or 18d. As in Figure 1, the physical contact of the device 10 with any of the switches 14, 18c or 18d before said pushing is applied by the user 11 is optional.

Figure 3a, in addition to said vertical switch 14, shows two switches 18c located on a side of the cradle 12b (said side is perpendicular to the bottom of the cradle 12b) in a plane parallel to the front plane of said communication device 10 and containing said vertical switch 14 and wherein said switches 18c reverse their state when pushed by said communication device 10, optionally using said vertical switch 14 as a pivotal point 14a for facilitating said front tilting motion 20. Figure 3b, in addition to said vertical switch 14, shows one switch 18d (it can be more than one,

according to the present invention) located on one side of the cradle **12b** in a plane parallel to the side plane (or perpendicular to the front plane) of said communication device **10** and containing said vertical switch **14** and wherein said switch **18d** reverses its state when pushed by said communication device **10**, optionally using said vertical switch **14** as a pivotal point **14a** for facilitating said side tilting motion **22**.

As in Figure 1, the reversal of the state of the switches **14**, **18c** or **18d** is communicated to said communication device **10** wherein said reversal is interpreted by the communication device **10** as the predetermined command given by the user **11**, as described below in detail in regard to Figure 4.

Finally, Figure 4 shows one example among others of a block diagram for transferring signals and mechanical forces between the cradle **12**, **12a** or **12b**, the user **11** and the communication device (e.g. the mobile device or the mobile phone) **10**. This block diagram applies to all scenarios shown in Figures 1a and 1b, 2a and 2b, 3a and 3b.

A mechanical force **36** is applied to the communication device (the mobile device or the mobile phone) **10** by the user **11** as an indication of a predetermined command to be transferred to said communication device **10**. This command, for example, can be to “pick up” the phone and start conversation in response to a phone ring. The mechanical force **36** creates a push force **38** imposing a pushing action of said communication device **10** on one of the switches **14**, **18a**, **18b**, **18c** or **18d** (or making a physical contact between the communication device **10** and one of said switches) to reverse the state of one of the switches **14**, **18a**, **18b**, **18c** or **18d**. Said reversal of the one of the switches **14**, **18a**, **18b**, **18c** or **18d** is communicated to said communication device **10** by sending a reversal signal **32** by one of the switches **14**, **18a**, **18b**, **18c** or **18d** to a communication block **30** of the cradle **12**, **12a** or **12b**. The communication block **30** sends a command signal **34** to the communication device **10** and completes said transferring of said predetermined command from the user **11** to the communication device **10**. The command signal **34** can be sent via a wire connection using a mechanical connector (e.g. pop port) or via a wireless connection using a wireless communication channel (such as bluetooth) by the communication block **30** to the communication device **10**.

There are many possible variations of the present invention. For example different types of switches can be used. One possibility is to use a switch responsive to a physical contact or a touch. Another variation relates to the pivotal point **14a** which can be used as the vertical switch **14**, for example, with higher pushing force required for its reversal than for other switches **18a 18b, 18c** or **18d**, or said pivotal point **14a** can be only used for said guiding the device **10** and not as a reversal switch.